

WHAT IS CLAIMED IS:

1           1.       A method for releasing a communication session involving network entities  
2 including session endpoints and intermediary network entities, comprising:  
3                    subscribing one or more of the network entities as subscribers to one or  
4 more of the intermediary network entities serving as notifiers;  
5                    releasing the communication session at a first one of notifiers;  
6                    initiating a session release notification via a signaling protocol from the first  
7 notifier to its respective subscriber;  
8                    logically advancing the session release notification towards a remote one of  
9 the session endpoints via the intermediary network entities; and  
10                  terminating the communication session at each of the network entities  
11 receiving the session release notification.

1           2.       The method as in Claim 1, wherein the signaling protocol comprises a  
2 Session Initiation Protocol (SIP), and wherein the intermediary network entities comprise  
3 Call Session Control Functions (CSCFs) in an IP Multimedia core network Subsystem  
4 (IMS).

1           3.       The method as in Claim 1, wherein initiating a session release notification  
2 comprises generating the session release notification in conformance with the signaling  
3 protocol, and wherein logically advancing the session release notification comprises  
4 passing the session release notification to the remote session endpoint by way of the  
5 intermediary network entities.

1           4.       The method as in Claim 3, wherein the first notifier comprises a Proxy Call  
2 Session Control Function (P-CSCF) in an IP Multimedia core network Subsystem (IMS).

1           5.       The method as in Claim 3, wherein passing the session release notification  
2 to the remote session endpoint by way of the intermediary network entities comprises  
3 forwarding the session release notification from one intermediary network entity to another  
4 intermediary network entity until reaching the remote session endpoint.

1           6.       The method as in Claim 1, wherein initiating a session release notification  
2 comprises generating a first session release notification in conformance with the signaling  
3 protocol, and wherein logically advancing the session release notification comprises:  
4                sending the first session release notification to the subscriber of the first  
5                notifier, wherein the subscriber of the first notifier serves as a second notifier to the  
6                remote one of the session endpoints; and  
7                generating a second session release notification at the second notifier, and  
8                passing the second session release notification to the remote session endpoint by  
9                way of the intermediary network entities.

1           7.       The method as in Claim 6, wherein the first notifier comprises a Serving  
2 Call Session Control Function (S-CSCF), and the second notifier comprises a Proxy Call  
3 Session Control Function (P-CSCF), in an IP Multimedia core network Subsystem (IMS).

1           8.       The method as in Claim 1, wherein terminating the communication session  
2 at each of the network entities comprises treating the session release notification as a  
3 session termination message in conformance with the signaling protocol at each of the  
4 network entities receiving the session release notification.

1           9.       The method as in Claim 8, further comprising issuing a session termination  
2 message at the remote session endpoint towards at least one other session endpoint in  
3 response to receiving the session release notification.

1           10.      The method as in Claim 1, wherein subscribing one or more of the network  
2 entities as subscribers comprises subscribing in conformance with the signaling protocol.

1           11.      The method as in Claim 10, wherein subscribing in conformance with the  
2 signaling protocol comprises subscribing via a Session Initiation Protocol (SIP).

1           12.      The method as in Claim 1, wherein the signaling protocol comprises an end-  
2 to-end signaling protocol.

1           13.     The method as in Claim 12, wherein the end-to-end signaling protocol  
2 comprises a Session Initiation Protocol (SIP), and wherein the intermediary network  
3 entities comprise Call Session Control Functions (CSCFs) in an IP Multimedia core  
4 network Subsystem (IMS).

1           14.     The method as in Claim 1, wherein at least one of the network entities  
2 serves as both a subscriber and a notifier.

1           15.     A method for releasing a dialog established over an IP Multimedia core  
2 network Subsystem (IMS) that supports services via the Session Initiation Protocol (SIP),  
3 wherein the IMS includes a plurality of Call Session Control Functions (CSCFs) including  
4 at least a Proxy CSCF (P-CSCF) and a Serving CSCF (S-CSCF) associated with each User  
5 Equipment (UE) involved in the dialog, the method comprising:  
6                   initiating the dialog from one UE towards another UE;  
7                   subscribing each P-CSCF associated with the dialog to its respective S-  
8 CSCF, and subscribing each of the UEs to the P-CSCF associated with the other UE;  
9                   generating a SIP session release notification at one of the CSCFs associated  
10 with a release of the dialog and transmitting the SIP session release notification towards its  
11 subscriber; and  
12                   releasing a dialog state at the remaining CSCFs as a result of the generation  
13 and transmission of the SIP session release notification.

1           16.     The method as in Claim 15, further comprising releasing the dialog state at  
2 at least one of the UEs as a result of the generation and transmission of the SIP session  
3 release notification.

1           17.     The method as in Claim 15, wherein the CSCF associated with the release  
2 of the dialog comprises a first one of the S-CSCFs, and wherein generating a SIP session  
3 release notification at the first S-CSCF comprises generating a SIP NOTIFY message and  
4 transmitting the SIP NOTIFY message towards a corresponding first P-CSCF that  
5 subscribed to the first S-CSCF.

1           18.     The method as in Claim 17, wherein releasing a dialog state at the  
2 remaining CSCFs comprises:  
3                 generating a second SIP NOTIFY message at the first P-CSCF, and  
4                 transmitting the second SIP NOTIFY message towards the UE that subscribed to  
5                 the first P-CSCF; and  
6                 releasing the dialog state at the remaining S-CSCFs and P-CSCFs in a path  
7                 from the first P-CSCF towards the UE that subscribed to the first P-CSCF.

1           19.     The method as in Claim 18, wherein releasing the dialog state at the  
2 remaining S-CSCFs and P-CSCFs comprises treating the second SIP NOTIFY message as  
3 a SIP BYE at each of the remaining S-CSCFs and P-CSCFs.

1           20.     The method as in Claim 18, further comprising receiving the second SIP  
2 NOTIFY message at the UE that subscribed to the first P-CSCF, and transmitting a SIP  
3 BYE message from the UE that subscribed to the first P-CSCF towards the other UE.

1           21.     The method as in Claim 20, further comprising releasing the dialog state at  
2 the UE receiving the SIP BYE message.

1           22.     The method as in Claim 15, wherein the CSCF associated with the release  
2 of the dialog comprises a first one of the P-CSCFs, and wherein generating a SIP session  
3 release notification at the first P-CSCF comprises generating a SIP NOTIFY message and  
4 transmitting the SIP NOTIFY message towards the UE that subscribed to the first P-CSCF.

1           23.     The method as in Claim 22, wherein releasing a dialog state at the  
2 remaining CSCFs comprises releasing the dialog state at the remaining S-CSCFs and P-  
3 CSCFs in a path from the first P-CSCF towards the UE that subscribed to the first P-CSCF.

1           24.     The method as in Claim 23, further comprising receiving the SIP NOTIFY  
2 message at the UE that subscribed to the first P-CSCF, and transmitting a SIP BYE  
3 message from the UE that subscribed to the first P-CSCF towards the other UE.

1           25.     The method as in Claim 24, further comprising releasing the dialog state at  
2     the UE receiving the SIP BYE message.

1           26.     The method as in Claim 23, wherein releasing the dialog state at the  
2     remaining S-CSCFs and P-CSCFs comprises treating the second SIP NOTIFY message as  
3     a SIP BYE at each of the remaining S-CSCFs and P-CSCFs.

1           27.     The method as in Claim 15, further comprising subscribing a first P-CSCF  
2     associated with a non-compliant UE with a second P-CSCF associated with the other UE.

1           28.     The method as in Claim 15, wherein the SIP session release notification  
2     comprises a SIP NOTIFY message including a state indication identifying a terminated  
3     state for the dialog, and further including a subscription state indication identifying a  
4     terminated subscription.

1           29.     A Serving Call Session Control Function (S-CSCF) operable in an IP  
2     Multimedia core network Subsystem (IMS), wherein the IMS includes at least a Proxy Call  
3     Session Control Function (P-CSCF) coupled to communicate with the S-CSCF, the S-  
4     CSCF comprising:  
5                 a processor;  
6                 a release recognition module operable with the processor to determine  
7     whether a session should be released at the S-CSCF;  
8                 a subscription management module operable with the processor to receive a  
9     subscription to a session release notification from the P-CSCF, wherein the session release  
10    notification includes a directive for the P-CSCF to release the session at the P-CSCF; and  
11                a notification module operable with the processor to generate the session  
12    release notification for transmission to the P-CSCF in response to the session being  
13    released at the S-CSCF.

1           30.     The S-CSCF as in Claim 29, further comprising a notification management  
2     module operable with the processor to receive second session release notifications

3 originating at other S-CSCFs or P-CSCFs associated with the session, to parse the second  
4 session release notifications, and to identify an indication to release the session at the S-  
5 CSCF.

1           31.     The S-CSCF as in Claim 30, further comprising a session termination  
2 module operable with the processor to receive the indication to release the session at the S-  
3 CSCF, and in response, to release the session at the S-CSCF.

1           32.     The S-CSCF as in Claim 29, wherein the session release notification further  
2 includes a second directive for the P-CSCF to terminate the subscription.

1           33.     A Proxy Call Session Control Functions (P-CSCF) operable in an IP  
2 Multimedia core network Subsystem (IMS), wherein the IMS includes at least a Serving  
3 Call Session Control Functions (S-CSCF) coupled to communicate with the P-CSCF, the  
4 P-CSCF comprising:  
5                   a processor;  
6                   a release recognition module operable with the processor to determine  
7 whether a session should be released at the P-CSCF;  
8                   a subscription management module operable with the processor to receive a  
9 subscription to a session release notification from a User Equipment (UE), wherein the  
10 session release notification includes a directive for the UE to release the session at the UE;  
11 and  
12                   a notification module operable with the processor to generate the session  
13 release notification for transmission to the UE in response to the session being released at  
14 the P-CSCF.

1           34.     The P-CSCF as in Claim 33, further comprising a subscription module  
2 operable with the processor to issue to the S-CSCF a subscription request for session  
3 release notifications originating at the S-CSCF.

1           35.     The P-CSCF as in Claim 34, further comprising a notification management  
2 module operable with the processor to receive and parse the session release notifications  
3 originating at the S-CSCF, and to identify an indication to release the session at the P-  
4 CSCF.

1           36.     The P-CSCF as in Claim 35, further comprising a session termination  
2 module operable with the processor to receive the indication to release the session at the P-  
3 CSCF, and in response, to release the session at the P-CSCF.

1           37.     The P-CSCF as in Claim 33, wherein the session release notification further  
2 includes a second directive for the UE to terminate the subscription.

1           38.     A system for communicating over an IP Multimedia core network  
2 Subsystem (IMS), comprising:  
3                   first and second User Equipments (UE) configured to engage in a dialog  
4 over the IMS;  
5                   a plurality of Call Session Control Functions (CSCF) associated with the  
6 IMS, comprising first and second Serving CSCFs (S-CSCF) and first and second Proxy  
7 CSCFs (P-CSCF);  
8                   wherein:  
9                   the first and second P-CSCFs serve as first points of communication  
10 within the IMS for the first and second UEs respectively, and are coupled to  
11 communicate with at least the first and second S-CSCFs respectively;  
12                   the first and second P-CSCFs are configured to subscribe to the first  
13 and second S-CSCFs respectively, and the first and second UEs are configured to  
14 subscribe to the second and first P-CSCFs respectively;  
15                   each of the CSCFs comprise a release recognition module  
16 configured to identify a release of the dialog, and a notification module to generate  
17 a release notification for transmission towards its respective subscriber; and  
18                   each of the UEs and CSCFs comprise a session release module  
19 configured to release the dialog in response to receiving the release notification.

1           39.     The system as in Claim 38, wherein each of the first and second UEs is  
2 further configured to initiate a second release notification for transmission towards the  
3 other one of the first and second UEs to release the dialog, in response to receiving the  
4 release notification originating at one of the CSCFs.

1           40.     A first network entity operable in a signaling network, wherein the  
2 signaling network includes at least a second network entity coupled to communicate with  
3 the first network entity, the first network entity comprising:  
4                   a processor;  
5                   a release recognition module operable with the processor to determine  
6 whether a session should be released at the first network entity;  
7                   a subscription management module operable with the processor to receive a  
8 subscription to a session release notification from the second network entity, wherein the  
9 session release notification includes a directive for the second network entity to release the  
10 session at the second network entity; and  
11                  a notification module operable with the processor to generate the session  
12 release notification for transmission to the second network entity in response to the session  
13 being released at the first network entity.

1           41.     A computer-readable medium having instructions stored thereon which are  
2 executable by a Call Session Control Function (CSCF) computer system for releasing a  
3 dialog established over an IP Multimedia core network Subsystem (IMS), the instructions  
4 executable by the CSCF computer system for performing steps comprising:  
5                   determining whether a session should be released at the CSCF;  
6                   accepting a subscription to a session release notification from a User  
7 Equipment (UE), wherein the session release notification includes a directive for the UE to  
8 release the session at the UE; and  
9                   generating the session release notification for transmission to the UE in  
10 response to the session being released at the CSCF.



1           42.     The computer-readable medium as in Claim 41, wherein the instructions  
2     executable by the CSCF computer system further comprises instructions for performing  
3     steps comprising:  
4                 parsing second session release notifications received from a second CSCF  
5     associated with the session, and in response identifying an indication to release the session  
6     at the CSCF; and  
7                 releasing the session at the CSCF if the indication to release the session at  
8     the CSCF is identified.

1           43.     The computer-readable medium as in Claim 41, wherein the instructions  
2     executable by the CSCF computer system further comprises instructions for performing  
3     steps comprising issuing a subscription request to a second CSCF associated with the  
4     session, wherein the subscription request comprises a request for session release  
5     notifications originating at the second CSCF associated with the session.